REMARKS

The undersigned thanks the examiner for the telephonic interview graciously granted today. The process claims have the limitation "wherein while in use the power generator is maintained at a temperature of from about -20°C to about 50°C" and have been allowed. In the interview the undersigned proposed an amendment to the article of manufacture claims whereby structure would be inserted into the claims for maintaining the power generator at a temperature of from about -20°C to about 50°C while in use. The examiner stated that this would probably render the article claims allowable. It is believed that agreement in principal has been reacted. This change does not involve new matter because the specification at page 8, lines 19-23 provides that the power generator will be maintained at a temperature of from about -20°C to about 50°C, more prefcrably from about 0°C to about 50°C and most preferably from about 20°C to about 50°C while in use. This disclosure certainly provides support for a device for this function.

Applicant gratefully acknowledges the Examiner's allowance of claims 22-26, 28-36 and 39, and the Examiner's indication that claims 5 and 21 contain allowable subject matter.

The Examiner has rejected claims 1-4, 6, 9-12, 15, 18, and 37-38 under 35 U.S.C. 102(b) over U.S. patent 5,372,617 to Kerrebrock et al. It is respectfully submitted that the rejection has been overcome by the instant amendment.

These claims have been amended to further comprise a device for maintaining the power generator at a temperature of from about -20°C to about 50°C while in use. This is neither taught nor suggested by Kerrebrock, et al.

Kerrebrock, et al. teaches a very different power generator than that taught by Applicant. Kerrebrock teaches a hydrogen generator for undersea vehicles powered by a fuel cell that requires the manufactures of high levels of electricity in order to be useful for its intended purpose. Their hydrogen generator operates by introducing either liquid water or steam

into a vessel that is loaded with a hydride, which hydride is then hydrolyzed to generate hydrogen gas. This generated hydrogen gas is then reacted at a fuel cell with oxygen supplied from a stored oxygen supply. As described in col. 8, lines 36-39, water is supplied to the chamber at a rate of approximately 4.5 ml/min per 1 kW of electrical power produced by the fuel cell, based on a fuel efficiency of 60 percent.

In order to generate sufficient electrical energy to power their undersea vehicle, the system taught by Kerrebrock, et al. requires both high operating temperatures and pressures in order to deliver gaseous water in the form of steam. Specifically, Kerrebrock discloses at col. 9, lines 30-35 an operating temperature range of from about 175°C to 250°C using their preferred hydride, with approximately 200°C being the optimal temperature. This is a significant distinction compared to the non-steam water vapor reactant used in the present invention which is present at temperature of from about -20°C to about 50°C.

While "water vapor" and "steam" are both forms of water, each has very different properties and uses. For example, a locomotive can be driven by steam, but will not operate on the water vapor present in humid air, as does the present invention. In and of itself, "water vapor" is the gas of individual water molecules that forms naturally over any body of water at any temperature, including ice. It has a low partial pressure, so it contains relatively few water molecules unless the water that forms it is heated. On the other hand, "steam" is made up of tiny hot water droplets produced by heating water to boiling. Steam contains about 100x more water molecules than does water vapor at 15°C, naturally expands with high force and velocity, and large amounts of water can be boiled and transported off as steam. Water vapor is present in everyday air and contains a much smaller number of water molecules than steam or liquid water, and moves very slowly by natural diffusion. Only very small amounts of water can be transported in the form of water vapor. To illustrate, a single drop of water takes typically one hour to evaporate at room temperature, while an entire kettle of water can be boiled into steam in about twenty minutes.

Kerrebrock describes pumping and injecting liquid water into a chamber containing a hydrogen producing fuel. The generated hydrogen gas then reacts in a fuel cell with a stored supply of oxygen gas to form electricity. Kerrebrock also teaches adding heaters to boil their liquid water to form steam as it is injected, because steam produces less clogging of their fuel (still injecting the same water, simply boiling it as it goes in). Thus, Kerrebrock also requires a heater to if he wants to boil the water. Kerrebrock does not teach the use of room-temperature water vapor, because they could not possibly generate enough power to drive an undersea vehicle by reacting a hydride with water vapor at -20° to 50°C. The present invention is a power generator for relatively low output power levels that do not need a large number of water molecules to react with the hydrogen fuel, with a sufficient number of water molecules present in the form of naturally-present water vapor, available from the natural force of diffusion moving the water. At operating temperatures of from about -20° to 50°C, a water vapor results in the production of much less electricity. To make an analogy, whereas the present invention is akin to a double A battery, Kerrebrock's invention is more like a power station generator, big and heavy, with pumps, heaters, paddles and motors generating a lot of power.

In contrast to Kerrebrock, the presently claimed invention uses the water vapor that forms naturally over a water reservoir to generate hydrogen gas. This hydrogen gas then reacts in a fuel cell with natural oxygen from the air to generate about 3 volts and about 1 mA of current, very similar to a single AA battery. The small amount of water that would be available through such water vapor as described by Applicant could not possibly produce any significant power by Kerrebrock's standards, compared to that from the liquid water or steam. Specifically, their power generator is only useful with the large quantity of water molecules available from liquid water or the amount of water boiled into steam. Accordingly, Kerrebrock does not teach a hydrogen generator that operates at from about -20°C to 50°C, and the hydrogen generator of Kerrebrock would not produce sufficient hydrogen gas to be satisfactory for its intended purpose using only water vapor at temperatures of from about -20°C to 50°C. Kerrebrock does not teach or suggest a device

for maintaining the power generator at a temperature of from about -20°C to about 50°C while in use. It is therefore respectfully submitted that Kerrebrock, et al. does not teach or suggest the claimed invention.

Claims 37 and 38 stand rejected under 35 U.S.C. 102(b) over U.S. patent 6,093,501 to Werth. It is respectfully submitted that the rejection has been overcome by the instant amendment. Similar to Kerrebrock, et al., Werth neither teaches nor suggests a power generator having a device for maintaining at a temperature of from about -20°C to about 50°C during operation. Specifically, Werth teaches a method of generating hydrogen gas by passing liquid water or steam at 230°C to 250°C over activated iron in the presence of a catalyst (see col. 3, lines 27-33; col. 5, lines 1-6.). This hydrogen gas is then generated into electricity in a fuel cell. While Werth does not teach the use of water vapor wherein the power generator maintained at a temperature of from about -20°C to about 50°C, they also teach away from low-temperature iron-water reactions, specifying that with a decrease in temperature, substantial larger amounts of iron reactant are required to generate enough hydrogen for their purposes (see col. 2, lines 18-37). Only by the addition of a catalyst are they able to operate their power generator at "relatively low temperatures, such as about 250°C" using a reasonable quantity of iron. Much like Kerrebrock et al., the power generator of Werth could not possibly transport enough water molecules in the form of water vapor at -20°C to 50°C to generate the power levels they describe to be satisfactory for their intended purpose. Werth does not suggest a device for maintaining the power generator at a temperature of from about -20°C to about 50°C while in use. It is therefore respectfully submitted that Werth does not teach or suggest the claimed invention.

The Examiner has rejected claims 13 and 14 under 35 U.S.C. 103(a) over Kerrebrock et al. in view of U.S. patent 6,358,488 to Suda. It is respectfully submitted that the rejection has been overcome by the instant amendment.

Kerrebrock et al. has been discussed above and those arguments are repeated herein. Suda describes a method for the generation of hydrogen gas by the reaction of a solid metal hydrogen complex compound in an aqueous alkaline solution, such as a 10% aqueous solution of sodium or potassium hydroxide, with a catalyst. The Examiner applies Suda to show that suitable catalysts include cobalt, nickel, ruthenium and alloys and combinations thereof. It is respectfully submitted that the disclosure of Suda is insufficient to overcome the differences between the claimed invention and Kerrebrock et al. Applicant respectfully asserts that a combination of Suda and Kerrebrock et al. would not teach or suggest the claimed invention to one skilled in the art, and one of ordinary skill in the art would not be able to arrive at the presently claimed invention with a reasonable expectation of success upon a reading of Kerrebrock along with Suda. Specifically, the combination of Kerrebrock et al. in view of Suda does not suggest a device for maintaining the power generator at a temperature of from about -20°C to about 50°C while in use. For these reasons it is respectfully submitted that the rejection has been overcome.

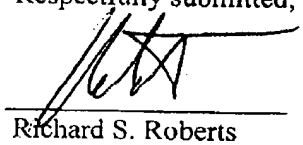
The Examiner has rejected claims 19 and 20 under 35 U.S.C. 103(a) over Kerrebrock et al. in view of U.S. patent 5,942,344 to Lehmeier et al. It is respectfully submitted that the rejection has been overcome by the instant amendment.

Kerrebrock et al. has been discussed above and those arguments are repeated herein. The Examiner has cited Lehmeier et al. to show that it would be obvious to include a heater with the claimed power generator to heat the fuel cell of the claimed invention. Lehmeier et al. discloses a high-temperature fuel cell system having a heating element for heating a fuel cell. Particularly, Lehmeier et al. teach a fuel cell system that is specifically directed to high-temperature uses having an operating temperature of at least 900°C. This is in direct contrast to the claimed invention which describes a low-temperature electrical power generator that has a temperature of from about -20°C to about 50°C during operation. It is respectfully submitted that the heater disclosed by applicant serves simply to maintain the power generator in this low-temperature range.

Applicant respectfully asserts that one skilled in the art would not look to combine the high-temperature heater of Lehmeier, et al. with the power generator of Kerrebrock, et al. to arrive at the presently claimed invention. More importantly, the disclosure of Lehmeier, et al., particularly the disclosure directed to heating a fuel cell, is insufficient to overcome the differences between the claimed invention. The combination of references would not teach or suggest a device for maintaining the power generator at a temperature of from about -20°C to about 50°C while in use to one skilled in the art, and one of ordinary skill in the art would not be able to arrive at the presently claimed invention with a reasonable expectation of success upon a reading of Kerrebrock, et al. along with Lehmeier, et al. For these reasons it is respectfully submitted that the rejection has been overcome and should be withdrawn.

The undersigned respectfully requests re-examination of this application and believes it is now in condition for allowance. Such action is requested. If the examiner believes there is any matter which prevents allowance of the present application, it is requested that the undersigned be contacted to arrange for an interview which may expedite prosecution.

Respectfully submitted,



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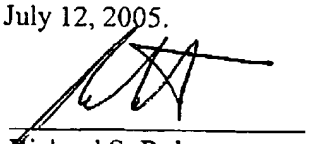

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